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PROCEEDINGS

ZRENJANIN, Oktobar 2020

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With this publication, the CD with all papers from the International Conference on Information Technology and Development of Education, ITRO 2020 is also published.

INTRODUCTION

For the first time the conference „Information Technology and Development of Education – ITRO 2020“ has been held on line, due to the covid-19 pandemic circumstances. The main goal of the conference was scientific discussion and interchange of information and experiences about the implementation of IT solutions in educational technology and the impact of different kinds of crises on children's access to quality education. Thematic fields of the conference are aligned with general trends in education, especially in technical sciences.

At the conference, within the poster session and at the plenary presentation, problems and, conditions were presented in the following areas: Theoretical and methodological issues of modern teaching, Personalization and learning styles, Social networks and their impact on education, Safety and security of children on the Internet, Curriculum of modern teaching, Methodological issues of teaching natural and technical sciences, Lifelong learning and professional development of teachers, E-learning, Management in education, Development and impact of information technology on teaching, Information and communication infrastructure in the teaching process, Improving the competencies of teachers and students. A significant number of papers were related to the implementation of teaching in the context of the COVID 19 pandemic.

At the end of the conference, and based on the papers of our participants, we conclude that the main focus points of this moment in education, which in one of the papers is called the "digital revolution", are the following:

- intensive work on increasing the level of responsibility of all participants in education,
- intensive work on the digitization of teaching content in order to overcome barriers and problems, of which one is certainly the dominant which is students motivation,
- intensive work on increasing competencies and professional support to teachers in the circumstances of a pandemic, different type of crisis and state of emergency,
- necessity of lifelong learning mechanisms,
- encouraging the research of attributes and relatively simple but sufficiently efficient approaches to assessing the metrics of the usability of educational technologies,
- encouraging the media to play a more active role in presenting the situation in the field of education professionally and objectively.

The ITRO Organizing Committee would like to thank the authors of papers, reviewers and participants in the Conference who have contributed to its tradition and successful realization.

We hope that next year our planet Earth will recover and that we will see each other live at the next conference.

We especially want to pay tribute to our late colleague professor Ivan Tasić PhD, as one of the founders of the ITRO conference. Our team thus suffered an irreparable loss, and his name will forever remain on the pages of the conference proceedings.

Chairman of the Organizing Committee

Ph.D Dragana Glušac

CONTENTS

SCIENTIFIC PAPERS

Statistical Data for Modern Communication in Mathematics Subjects at Faculty

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Abstract - This paper specified the applications used for online teaching in the academic year 2019/2020 in both universities Goce Delcev, Stip and Mother Teresa, Skopje. Then two different questionnaires are listed for students from both universities in order to see their opinion on online teaching for all subject but especially for mathematics subjects. The results of the questionnaires are presented and conclusions from them are drawn. Finally, the opinions of the students from the two universities are compared in order to see if the opinions are the same, similar or different.

I. INTRODUCTION

The 2019/2020 school year was unusual for all primary, high schools and universities around the world, because one period of teaching had to be online. Of course, the same situation was in our country. In this paper our aim is the online teaching, especially online teaching for all mathematics subjects in Universities: Mother Teresa - Skopje and Goce Delchev - Stip.

Information and communication technology in the teaching process in Universities was introduced in the beginning of XXI century. Many universities in the Republic of North Macedonia have used the opportunities offered by e-learning and explored students' habits creating virtual learning environments [12]. The mathematics professors in the two mentioned universities have tried and taught the students to use the e-learning tool, so that the students already knew how to communicate with each other and with the teaching staff at any time and from any place. In paper [9] authors compare the achievements of students in Math 1 who use Moodle as a teaching tool with those who does not. They conclude how e-learning impacts on the success of the students based on the results obtained.

During the teaching process, several professors of mathematics at both universities included program packages for better visual presentation of mathematical problems. The programing packet MATHEMATICA offers an excellent possibility for visualization in math education, because it has a lot of built-in- functions. This packet enables authors of paper [10] to make highly abstract mathematical content more understandable to pupils and students. By using this packet, they find limit value of a sequence and function, derivate of a function… which leads to a simpler understanding of these notions. In paper [6] the authors considered question: Does the technical equipment of the classrooms bring better results in mastering the teaching program by the students? Also, authors determine the quality of knowledge which the students get, when learning the topic "Construction of triangle and quadrangle", with use of free software GeoGebra and informatics / mathematics approach, by comparing the achieved results on the diagnostic and the final test, of the experimental and the control group.

Both mentioned Universities were the subject of research in [1] and [3]. In [1] authors analyze and compare the final grades of the students from two Universities, Goce Delcev University - Stip, more specifically a group of students who studied in Kavadarci and students from the University "Mother Teresa" in Skopje, for Math subject. [3] was the beginning of the research in which authors have two groups of students, at two Universities: Mother Teresa Skopje and Goce Delchev - Stip. The students were process mathematical contents (algebra, geometry, analysis) in two different ways: the first group with GeoGebra and on a computer, and the other one without visualization and GeoGebra. Then a testing was done, the results were compared, and a conclusion was drawn.

At the Goce Delchev University, students were often tested electronic for the knowledge they gained in some mathematical subjects. As example, in paper [2] authors analyzed and compared the results of the electronic testing (e-testing) for the subject Mathematics 2 within Goce Delcev University – Stip using statistical data processing. Electronic testing covers the topic "Integral". [4] is a proposal how to improve the evaluation process in mathematics by using standardized electronic tests

created by multimedia software Wondershare QuizCreator software.

ICT in teaching process is very important also in primary schools. A research [5] was conducted in order to ensure valid and reliable assessment of the extent of ICT knowledge and skills of teachers in primary schools, to identify the factors in terms of teachers affecting the development of ICT competences, and to identify strategies to improve the development of effectiveness in the future. Paper [7] is focused on processes of modernization of teaching mathematics in primary schools by using ICT. The empirical results from the realized research shows that the Macedonian educational system should introduced and practiced ICT for math teaching. The survey has been conducted [8], in order to investigate the factors that affect the motivation of teachers to use ICT in their teaching and to maintain the same. In paper [11] are present the possibilities for revision and development of the curriculum of "Math Teaching Methods" related to Child-centered methodology and ICT integration.

Until the academic year 2019/2020, ICT was only an additional to the classic course of the teaching process. With the pandemic appearance, the online applications became a basic model for implementing the teaching process.

In Goce Delcev University online teaching was performed by Microsoft Teams. Microsoft Teams is a client that enables online interactive lectures. If you have a licensed Microsoft Office, you probably already have it on your device and all you have to do is to look for it in the menu of installed programs. The channel (separate virtual space) for different user purpose can be created, for example: you can create two channels for Lectures and Exercises. An online lecture can be scheduled by invitation through Outlook Calendar and New Teams Meeting. This option is proof that everyone has been correctly invited to listen the lecture. During the lecture you can watch the students if their cameras are turned on, interact with them using chat and discussion. All mathematics subject for students also were conducted online.

In University Mother Teresa online teaching was performed by Google Classroom, the free web service developed by Google.

II. RESEARCH METHODOLOGY

The research methodology consists of two questionnaires. The first questionnaire (Questionnaire 1) consists of 12 questions. This questionnaire is given in Table 1

TABLE I. QUESTIONNAIRE 1

Question	Possible Answer		
	Yes	No	I have no final attitude
1.Was it difficult for you to learn to use the application provided by your university for online teaching?			
2.Do you think the application you are using is good for the teaching?			
3.Do you think another application should be used?			
4.Do you think that the results of the students in the exams after the online classes depend a lot on the application that is used?			
5.Have you mastered the material enough with online teaching?			
6.Do you think there is a big difference between online and classical teaching?			
7.Do you think that teaching should be online and under normal living conditions?			

8.Do you think that online teaching is equally good for every subject?			
9.Is online teaching good for all math subjects?			
10. Do you agree that the exam session for math subject is good to get online?			
11. Do you mind that the results achieved as a result of online classes would be the same for math subject as those after classic classes?			
12. Would it be good to have consultations in the classic way with math subject teachers before the session?			

The second questionnaire (Questionnaire 2) consists of 4 questions seeking a complete answer.

Questionnaire 2

1. Which online teaching application do you know, have you tried to use, and would you like to use in teaching?

2. List the advantages and disadvantages of online classes.

3. Would the lack of communication with colleagues' face to face in online classes affect you badly?

4. Explain why online teaching is good/bad for all math subjects.

The questionnaires were answered by groups of 30 students from different school years, from both Universities in the period from 20.06.2020 to 28.06.2020 when the online teaching for the academic year 2019/2020 was completed.

III. MAIN RESULTS

First, we will show the results for Questionaire1 and Questionnaire 2 from Goce Delcev University - Stip. Question are answered in the same order how they are given above and the blue colored pillar displays the answers yes, the brown answers no and the gray answers: I have no final attitude.

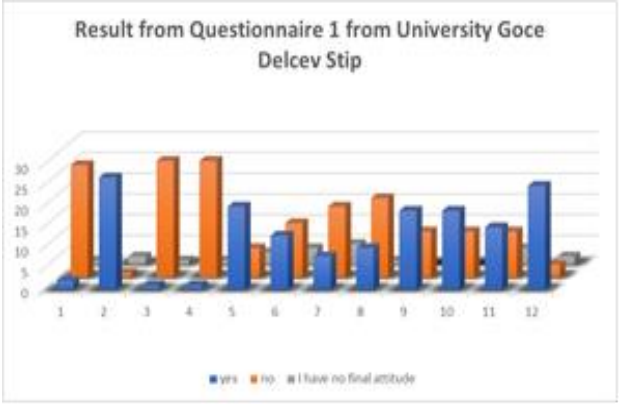

Figure 1. Results from UGD

Resultcs from Questionnaire1 can be clearly seen from the Fig.1. So, we can see that students didn't find it difficult to learn to use the application provided by their university for online teaching, they didn't thing to use another application for learning and also didn't think that the results of the students in the exams after the online classes depend a lot on the application that is used. Students also thing that it would be good to have consultations in the classic way with math subjects teachers before the session.

Results from Questionaire2 showed that students do not care about the platform used for online teaching. They know several other online learning apps like Zoom, Google Meet, Google Classroom … They believe that the application they use is not "to blame" for the disadvantages of online teaching. That is why they have no special interest in introducing a new application. According to them disadvantage of online teaching is the direct contact of a student-professor. They consider the advantages to be: 24-hour availability of the professors, the fast and simple communication and the availability of the learning material as opposed to the fact that during the class they mistype from the board. The absence of socializing during breaks between classes as a lack of online teaching was a serious problem for students as they often felt lonely, scared and worried. And almost everyone agreed that the absence contact with other colleagues negatively affects them primarily on their mental state. For math subject all students are thinking that online teaching does not bring same problems because in their teaching process before all teachers involve ICT. Math program as: GeoGebra, Wolfram Mathematica, Matlab, help them to solve many problems now and

before. They have previously attached work material to e-learning, they knew how to use e-learning, they had enough practice material and enough online contacts with teachers. Nevertheless, for the mathematics subjects, the students think that in normal living conditions it is best to hold classical classes because mathematics is not a simple science and mathematics is not easy to overcome. As a disadvantage they mention the absence of contacts with colleagues during the breaks when they explained the obscure tasks solved in the class among each other. Some of the weaker students point out the lack of face-to-face consultations with professors as a disadvantage. The disadvantage of online teaching that all students agree on is the need of modern technology (smartphone, laptop, computer, etc.) as well as the Internet. Many students who faced this problem were among the respondents.

Now we will show the results from University Mother Teresa - Skopje. The results for Questionaire1 from University Mother Teresa Skopje are given in Fig.2.

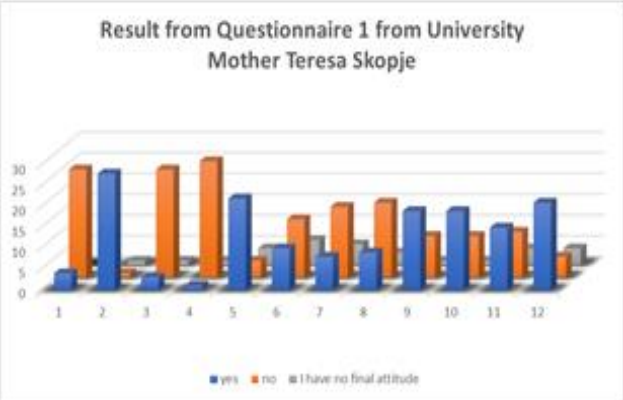

Figure 2. Results from MT

Results from Questionnaire 2 for the first question was the same as at University in Stip, that students do not care about the platform used for online teaching. They don't know other online learning apps. In relation to the second question as an advantage's student see the comfort of home for online learning and flexibility of communication with professors as well as the optimal studies costs. However, one of the biggest disadvantages of online learning is the need for information technology and the Internet. Regarding the question "Would the lack of face-to-face communication with colleagues in online classes affect you badly?", students unanimously answered "yes". Regarding the answer to the last question, there are a student who see online learning as good, but in global everyone shares the opinion that online learning of mathematics subjects is not an excellent method. They think that this way of learning is a good solution for the current situation, but they wish the previous way of teaching to be returned as soon as possible. Students think that physical presence teaching is appropriate in terms of mathematics subjects, due to the specifics of the subject and their habits created during the previous levels of education.

IV. CONCLUSION

The opinions of the students from both Universities on many of the questions coincide. This means that students share the same opinion and many of them want the teaching process to be online at least during the pandemic and then classical teaching to be returned. All the students think that there is no better way of learning than the classical teaching.

In general for all subjects at the end of the semester of 2019/2020 school year, almost 70% of the students from Goce Delcev University - Stip were satisfied with the online classes and said that they would continue the next semester with online if we still have the restrictions due to the pandemic. Many the students from University Mother Teresa - Skopje stated that in general for all subjects they do not feel as much prepared for online learning. Many of them support online learning only during a pandemic.

After the situation caused by the pandemic; education politics will have to change their ways of behaving in order to help students to enter in the digital world much more prepared. Confirmation for the well-done work for Goce Delcev University - Stip was given by "Microsoft". On their official website they published that Goce Delcev University is the most successful University in the Republic of North Macedonia in transition from physical to distance learning.

The new reality creates many challenges and seriously influences universities to change their profile in universities that are research competitive, information recognizable and accessible, so they need to constantly invest in advanced scientific and information technologies that will be available to all students.

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